REMARKS/ARGUMENTS

By the present Amendment, claims 1-31 are pending in this application. Claims 1, 15, 19, 22, and 29-31 are amended herein. Basis for these amendments may be found throughout the specification and claims as originally filed. For example, basis for the amendments in claims 1 and 15 may be found in paragraph [0025] and in claim 30 as originally filed; basis for the amendments in claim 22 may be found in paragraphs [0022] and [0028], Example 1, and in claim 5 as originally filed. No new matter has been added.

Drawings

The Action has objected to the drawings because the polymer jet feature as disclosed in paragraph [0037] of the specification is not shown in Figure 1.

Applicants have attached a corrected drawing for Figure 1, which shows the polymer jet feature and is in compliance with 37 CFR § 1.121(d). Applicants request reconsideration and removal of this objection.

Specification

The Action has objected to the specification for the following informalities:

Paragraph [0003] specifies that electrospinning is a method of producing fibers with "diameters ranging from 10 nm to 100 fun." As amended herein, this paragraph recites "diameters ranging from 10 nm to 10 m."

Paragraphs [0035] and [0037] identify both the "direct current source" and "polymer jet" as being item 9, respectively. As amended herein, paragraph [0037] identifies the "polymer jet" as item 10.

Applicants request reconsideration and removal of these objections.

Claim Objections

The Action has objected to claim 19 under 37 CFR § 1.75(c) as allegedly being of improper dependent form for failing to further limit the subject matter of claim 18 because the liquid phase of claim 18 is not further limited by the statement in claim 19 that the liquid phase comprises one or a plurality of liquids, since a liquid phase would inherently comprise either one or a plurality of liquids.

As amended herein, claim 19 recites that the liquid phase comprises a plurality of liquids, which further limits claim 18 and therefore, is in proper dependent form.

The Action has objected to claims 18 and 22 for the following informalities:

Claim 18 should have one instance of "diameter" deleted. Claim 18 does not recite the term "diameter." However, claim 29 recites this term twice. An appropriate amendment deleting one instance of this term in claim 29 has been made.

Claim 22 should have the term "poly" directly in front of "(vinylidene fluoride-co-trifluoroethylene)." An appropriate amendment adding this term to claim 22 has been made.

Applicants request reconsideration and removal of these objections.

Claim Rejections - 35 U.S.C. § 103

Claims 1, 2, 4-11, 13-16, and 18-31

The Action has rejected claims 1, 2, 4-11, 13-16, and 18-31 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chu et al. (U.S. 2003/0054035), and in view of Kleinmeyer et al. (U.S. 2002/0089094). Applicants respectfully disagree.

As amended herein, the claimed invention distinguishes over the cited references by claiming an apparatus and methods thereof, for fabricating oriented polymer fibers. The claimed invention includes a dispenser, for containing an electrically charged metastable polymer

dispersion, having a proximal and a distal end wherein the proximal end defines an orifice; an electrode positioned near the proximal end of the dispenser defining the orifice, wherein the electrode and the proximal end of the dispenser defining the orifice define a gap there between, wherein the gap between the proximal end of the dispenser defining the orifice and the electrode is between about 1 millimeter and about 10 millimeters; and a collector for receiving the oriented polymer fibers, wherein the collector is separated from the gap.

As a result of having the proximal end of the dispenser defining the orifice and the electrode in close proximity, the application of a high voltage electric potential to the electrode causes a portion of the metastable polymer dispersion to be electrically pulled through the orifice to create a liquid column motion followed by the formation of a polymer jet. The polymer jet is accelerated in the electric field towards a collector to provide the oriented polymer fibers. Thus, the close proximity of the orifice and the electrode and the high voltage applied to the electrode, surprisingly, provides for an accelerated polymer jet that is collected to provide the oriented polymer fibers.

Chu does not teach or suggest any such apparatus or methods. Instead, this publication teaches cell storage and delivery systems and methods for their preparation through an electrospinning process. This process provides a biodegradable and/or bioadsorbable fibrous matrix physically associated with viable cells that contain and release cells at a controlled rate. In particular, this publication teaches an electrospinning apparatus having positively charged spinneret for the formation of the positively charged polymer solution droplet, and a plate electrode with a small exit hole in the center that forms the jet stream. This publication also teaches that if the polymer droplet on the positively charged spinneret has a typical dimension of 2-3 mm and the plate electrode is placed at a distance of about 10 mm from the spinneret, a reasonable electrostatic potential can be developed; and that the short distance between the two electrodes implies that the electrostatic potential could be fairly low (i.e. 1.5-2 kV) but sufficiently strong for the electrostatic spinning process (typically 15 kV). This publication also teaches that the positively charged jet stream passing through the plate electrode exit hole

requires the application of an external electric field, set slightly below the plate electrode base potential, to prevent the charged stream from becoming unstable in its trajectory, i.e. defocused, resulting in loss of control over the microscopic and macroscopic properties of the fluid (see, paragraphs [0204] to [0207]). Thus, this publication teaches an electrospinning process that uses low electrostatic potentials between the two electrodes spaced about 10 mm apart and an external electric field set slightly below the plate electrode base potential for stability in order to provide a fibrous matrix. This publication however, does not teach or suggest any apparatus or methods for fabricating oriented polymer fibers as required by the instant claims. Thus, one of skill in the art would not have been motivated to modify the teachings of this publication, either based on their own general knowledge or on what this publication teaches, in order to arrive at the claimed invention.

Kleinmeyer does not cure the defects of Chu because this publication does not teach or suggest the claimed invention. Instead, this publication teaches an apparatus and methods thereof, for producing polymer filaments using an electrospinning process wherein a thread-forming polymer is extruded through an anodically biased die orifice, passed through a series of anodically biased electrofields, wherein each electrode is sequentially biased at a lower voltage than the preceding electrode, and the resulting oriented polymer filament is collected on a grounded collector. Thus, this publication teaches an electrospinning process that uses a series of electrodes, each having a lower voltage than the preceding electrode, in order to provide a polymer filament. This publication however, does not teach or suggest any apparatus or methods for fabricating oriented polymer fibers as required by the instant claims. Thus, one of skill in the art would not have been motivated to modify the teachings of Chu, either based on their own general knowledge or on what Kleinmeyer teaches, in order to arrive at the claimed invention.

Nor would one of skill in the art, either based on their own general knowledge or on what these references teach, have any reasonable expectation of success in arriving at the claimed invention. As described above, Chu teaches an electrospinning process that uses low electrostatic potentials between two electrodes spaced about 10 mm apart and an external electric

field set slightly below the plate electrode base potential for stability in order to provide a fibrous matrix; and Kleinmeyer teaches an electrospinning process that uses a series of electrodes each having a lower voltage than the preceding electrode in order to provide an oriented polymer filament; whereas the claimed invention provides an electrospinning apparatus and methods thereof, which require an electrode positioned near the orifice of a dispenser containing an electrically charged metastable polymer dispersion, and an electric voltage of between about 20 kV and 40 kV applied to the electrode positioned near the orifice in order to create the polymer jet stream, which is accelerated in the electrical field towards a grounded collector to provide the oriented polymer fibers. Thus, combining the teachings of Chu with Kleinmeyer would not lead one of skill in the art to have any reasonable expectation of success in arriving at the claimed invention.

Claims 1, 2, 4-16, 18-20, and 27-30

The Action has rejected claims 1, 2, 4-16, 18-20, and 27-30 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Childs (U.S. 2,338,570), and in view of Kleinmeyer. Applicants respectfully disagree.

As described above, the claimed invention distinguishes over the cited references by claiming an apparatus and methods thereof, for fabricating oriented polymer fibers.

Childs does not teach or suggest any such apparatus or methods. Instead, this patent teaches an electrospinning apparatus and methods thereof, involving continually extruding a highly charged cellulose derivative solution through the orifice of a spinneret constructed of a dielectric material in a fine stream, into an electrostatic field maintained between the spinneret and a directing electrode of opposite potential, whereby the cellulose derivative material is separated from the solution in the form of short fibers or staples which are attracted to the dry, unsupported collecting tail of previously formed fibers, and the fibers drawn off as a yarn. This patent however, does not teach or suggest any apparatus or methods for fabricating oriented polymer fibers as required by the instant claims. Thus, one of skill in the art would not have

been motivated to modify the teachings of this patent, either based on their own general knowledge or on what this patent teaches, in order to arrive at the claimed invention.

Kleinmeyer does not cure the defects of Child because this publication does not teach or suggest the claimed invention. As described above, Kleinmeyer teaches an electrospinning process that uses a series of electrodes each having a lower voltage than the preceding electrode in order to provide an oriented polymer filament. This publication however, does not teach or suggest any apparatus or methods for fabricating oriented polymer fibers as required by the instant claims. Thus, one of skill in the art would not have been motivated to modify the teachings of Childs, either based on their own general knowledge or on what Kleinmeyer teaches, in order to arrive at the claimed invention.

Nor would one of skill in the art, either based on their own general knowledge or on what these references teach, have any reasonable expectation of success in arriving at the claimed invention. As described above, Childs teaches an electrospinning apparatus and methods thereof, which continually extrudes a highly charged cellulose derivative solution through the orifice of a spinneret in a fine stream into an electrostatic field maintained between the spinneret and a directing electrode of opposite potential, wherein the resulting fibers are drawn off as a yarn; and Kleinmeyer teaches an electrospinning process that uses a series of electrodes each having a lower voltage than the preceding electrode in order to provide an oriented polymer filament; whereas the claimed invention provides an electrospinning apparatus and methods thereof, which require an electrode positioned near the orifice of a dispenser containing an electrically charged metastable polymer dispersion, and an electric voltage of between about 20 kV and 40 kV applied to the electrode positioned near the orifice in order to create the polymer jet stream, which is accelerated in the electrical field towards a grounded collector to provide the oriented polymer fibers. Thus, combining the teachings of Childs with Kleinmeyer would not lead one of skill in the art to have any reasonable expectation of success in arriving at the claimed invention.

Claims 3 and 17

The Action has rejected claims 3 and 17 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chu et al. and Kleinmeyer et al., and as being unpatentable over Childs and Kleinmeyer as applied to claims 2 and 16, both separately in view of Lee et al. (U.S. 2002/ 0122840). Applicants respectfully disagree.

As described above, the claimed invention distinguishes over the cited references by claiming an apparatus and methods thereof, for fabricating oriented polymer fibers.

Also as described above, neither Chu, Kleinmeyer nor Childs teach or suggest any such apparatus or methods.

Lee does not cure the defects of these references because this publication does not teach or suggest the claimed invention. Instead, this publication teaches an apparatus and methods thereof, for manufacturing porous polymer web using an electrospinning method by forming, pressurizing and supplying at least one or more kinds of polymer materials in a liquid state; and discharging and piling the polymer materials to a moving collector through one or more charged nozzles, the collector being located under the nozzles and charged to have a polarity opposed to the polarity of the charged nozzles. This publication however, does not teach or suggest any apparatus or methods for fabricating oriented polymer fibers as required by the instant claims. Thus, one of skill in the art would not have been motivated to modify the teachings of Childs, either based on their own general knowledge or on what Chu, Kleinmeyer, and Childs teaches, in order to arrive at the claimed invention.

Nor would one of skill in the art, either based on their own general knowledge or on what these references teach, have any reasonable expectation of success in arriving at the claimed invention. As described above, Chu teaches using low electrostatic potentials between the two electrodes spaced about 10 mm apart during the electrospinning process and using an external electric field, set slightly below the plate electrode base potential, for stability in order to provide a fibrous matrix; Kleinmeyer teaches an electrospinning process that uses a series of electrodes

each having a lower voltage than the preceding electrode in order to provide an oriented polymer filament; Childs teaches continually extruding a highly charged cellulose derivative solution through the orifice of a spinneret in a fine stream into an electrostatic field maintained between the spinneret and a directing electrode of opposite potential, wherein the resulting fibers are drawn off as a yarn; and Lee teaches an electrospinning process wherein liquid polymer materials are discharged through a charged nozzle and the polymer materials are piled onto a moving, oppositely charged collector located under the nozzles, to provide a porous polymer web; whereas the claimed invention requires whereas the claimed invention requires having an electrode positioned near the orifice of a dispenser containing an electrically charged metastable polymer dispersion, and having an electric voltage of between about 20 kV and 40 kV applied to the electrode positioned near the orifice in order to create the polymer jet stream, which is accelerated in the electrical field towards a grounded collector to provide the oriented polymer fibers. Thus, combining the teachings of Chu, Kleinmeyer, Childs and Lee would not lead one of skill in the art to have any reasonable expectation of success in arriving at the claimed invention.

Claim 12

The Action has rejected claim 12 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chu and Kleinmeyer as applied to claim 1, and in view of Childs. Applicants respectfully disagree.

As described above, the claimed invention distinguishes over the cited references by claiming an apparatus and methods thereof, for fabricating oriented polymer fibers. As described above, neither Chu, Kleinmeyer nor Childs teach or suggest any such apparatus or methods.

It is respectfully submitted that the claimed invention is not obvious over the cited references for the reasons described above. Applicants respectfully request reconsideration and removal of these rejections.

CONCLUSION

In view of the above amendments and remarks, reconsideration and favorable action on all claims are respectfully requested. In the event any matters remain to be resolved, the Examiner is requested to contact the undersigned at the telephone number given below so that a prompt disposition of this application can be achieved.

No fees are believed to be due with the present communication, however, the Commissioner is hereby authorized to charge any fees that may be due in connection with the filing of this paper, or credit any overpayment to Deposit Account No. 07-1896, referencing the above-identified Attorney Docket Number.

Respectfully submitted,

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